MPE TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd
FCC ID	XMR201910BG95M3
Product	LTE Cat M1 & Cat NB2 & EGPRS Module
Brand	Quectel
Model	BG95-M3, BG95-M3 MINIPCIE
Report No.	R2006A0361-M1V1
Issue Date	October 15, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Yu Wang

Prepared by: Yu Wang

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Table of Contents

Version	Revision description	Issue Date
Rev.0	/	August 6, 2020
Rev.1	Update information in Page 6	October 15, 2020
Note This revised report (Report No. R2006A0361-M1V1) supersedes and replaces the previously issued report (Report No. R2006A0361-M1). Please discard or destroy the previously issued report and dispose of it accordingly.		

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.**The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
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Website:	http://www.ta-shanghai.com
E-mail:	fanguangchang@ta-shanghai.com

1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

General Technologies

Model	BG95-M3, BG95-M3 MINIPCIE
IMEI	864475040001736 for BG95-M3 864475040484106 for BG95-M3 MINIPCIE
Hardware Version	R2.1
Software Version	BG95M3LAR02A03
Date of Testing:	August 20, 2019 ~ September 5, 2019

BG95-M3 MINIPCIE (Report No.: R2006A0361-M1V1) is a variant model of BG95-M3 (Report No.: R2003A0152-M1V1). Test values duplicated from Original for variant. There is no test for variant in this report. The detailed product change description please refers to the ANNEX B.

There is no test for BG95-M3 in this report(Report No.:R2003A0152-M1V1).All test values duplicated from the BG95-M3 report (Report No. : R1907A0446-M1). The detailed product change description please refers to the ANNEX A.

3 Maximum conducted output power (measured) and antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by
Numeric gain (G)=10^(antenna gain/10)

Band		Burst Turn up Power(dBm)	Division Factors (dB)	Time-Averaged Tune up Power (dBm)
GSM850	GSM	35.000	-9.03	25.97
GSM1900	GSM	32.000	-9.03	22.97

Note:
Division Factors

To average the power, the division factor is as follows:
1Txslot = 1 transmit time slot out of 8 time slots
=> conducted power divided by (8/1) => -9.03 dB
2Txslots = 2 transmit time slots out of 8 time slots
=> conducted power divided by (8/2) => -6.02 dB
3Txslots = 3 transmit time slots out of 8 time slots
=> conducted power divided by (8/3) => -4.26 dB
4Txslots = 4 transmit time slots out of 8 time slots
=> conducted power divided by (8/4) => -3.01 dB

Band	Maximum Conducted Output Power (dBm)	
	(dBm)	(mW)
GSM850	25.970	395.367
GSM1900	22.970	198.153
LTE Band 2	22.000	158.489
LTE Band 4	22.000	158.489
LTE Band 5	22.000	158.489
LTE Band 12	22.000	158.489
LTE Band 13	22.000	158.489
LTE Band 25	22.000	158.489
LTE Band 26	22.000	158.489
LTE Band 66	22.000	158.489
LTE Band 85	22.000	158.489
NB-IOT Band 2	22.000	158.489
NB-IOT Band 4	22.000	158.489
NB-IOT Band 5	22.000	158.489

NB-IOT Band 12	22.000	158.489
NB-IOT Band 13	22.000	158.489
NB-IOT Band 25	22.000	158.489
NB-IOT Band 66	22.000	158.489
NB-IOT Band 71	22.000	158.489
NB-IOT Band 85	22.000	158.489

4 Test Result

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following

TABLE 1 – LIMITS FOR MAXIMUN PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0 ……	614	1.63	*(100)	6
3-30 ……	1842/f	4.89/f	*(900/f2)	6
30-300 ……	61.4	0.163	1.0	6
300-1500 ……	……	……	f/300	6
1500-100,000 ……	……	……	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34 ……	614	1.63	*(100)	30
1.34-30 ……	824/f	2.19/f	*(180/f2)	30
30-300 ……	27.5	0.073	0.2	30
300-1500 ……	……	……	f/1500	30
1500-100,000 ……	……	……	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0.So

Band	The maximum permissible exposure (mW/cm2)
GSM850	0.566
GSM1900	1.000
LTE Band 2	1.000
LTE Band 4	1.000
LTE Band 5	0.566
LTE Band 12	0.477
LTE Band 13	0.525
LTE Band 25	1.000
LTE Band 26	0.566
LTE Band 66	1.000
LTE Band 85	0.477
NB-IOT Band 2	1.000
NB-IOT Band 4	1.000
NB-IOT Band 5	0.566
NB-IOT Band 12	0.477
NB-IOT Band 13	0.525
NB-IOT Band 25	1.000
NB-IOT Band 66	1.000
NB-IOT Band 71	0.465
NB-IOT Band 85	0.477

Band	Maximum Conducted Output Power (dBm)	EIRP limit (dBm)	Margin1 (dB)	Power density Limit		Margin2 (dB)	Final Margin (dB)
				(mW/cm^2)	(dBm)		
GSM850	25.970	40.600	14.630	0.566	34.541	8.571	8.571
GSM1900	22.970	33.000	10.030	1.000	37.013	14.043	10.030
LTE Band 2	22.000	33.000	11.000	1.000	37.013	15.013	11.000
LTE Band 4	22.000	30.000	8.000	1.000	37.013	15.013	8.000
LTE Band 5	22.000	40.600	18.600	0.566	34.541	12.541	12.541
LTE Band 12	22.000	36.920	14.920	0.477	33.798	11.798	11.798
LTE Band 13	22.000	36.920	14.920	0.525	34.214	12.214	12.214
LTE Band 25	22.000	33.000	11.000	1.000	37.013	15.013	11.000
LTE Band 26	22.000	40.600	18.600	0.566	34.541	12.541	12.541
LTE Band 66	22.000	30.000	8.000	1.000	37.013	15.013	8.000
LTE Band 85	22.000	36.920	14.920	0.477	33.798	11.798	11.798
NB-IOT Band 2	22.000	33.000	11.000	1.000	37.013	15.013	11.000
NB-IOT Band 4	22.000	30.000	8.000	1.000	37.013	15.013	8.000
NB-IOT Band 5	22.000	40.600	18.600	0.566	34.541	12.541	12.541
NB-IOT Band 12	22.000	36.920	14.920	0.477	33.798	11.798	11.798
NB-IOT Band 13	22.000	36.920	14.920	0.525	34.214	12.214	12.214
NB-IOT Band 25	22.000	33.000	11.000	1.000	37.013	15.013	11.000
NB-IOT Band 66	22.000	30.000	8.000	1.000	37.013	15.013	8.000
NB-IOT Band 71	22.000	36.920	14.920	0.465	33.687	11.687	11.687
NB-IOT Band 85	22.000	36.920	14.920	0.477	33.798	11.798	11.798

Note: 1. The Maximum allowed antenna gain per Band should be less than or equal to the **Final Margin** which is the allowable maximum gain value to comply with limits for maximum permissible exposure (MPE).
2. The Final Margin is determined and selected to the worst-case of Margin1 and Margin2.
3. Margin1=EIRP Limit(dBm)-Maximum Conducted Power (dBm). EIRP limit reference standard part22/ part24/part27and part90 for each band, EIRP = ERP + 2.15 (dB).
4. Margin2=Power density Limit(dBm)-Maximum Conducted Power (dBm). Power density Limit(dBm): The max. obtained by MPE with 20cm.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20

cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm^2)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	PG (mW)	Test Result (mW/cm^2)	Limit Value (mW/cm^2)	Conclusion
GSM850	2845.116	0.566	0.566	Pass
GSM1900	1995.262	0.397	1.000	Pass
LTE Band 2	1995.262	0.397	1.000	Pass
LTE Band 4	1000.000	0.199	1.000	Pass
LTE Band 5	2845.116	0.566	0.566	Pass
LTE Band 12	2397.728	0.477	0.477	Pass
LTE Band 13	2638.761	0.525	0.525	Pass
LTE Band 25	1995.262	0.397	1.000	Pass
LTE Band 26	2845.116	0.566	0.566	Pass
LTE Band 66	1000.000	0.199	1.000	Pass
LTE Band 85	2397.728	0.477	0.477	Pass
NB-IOT Band 2	1995.262	0.397	1.000	Pass
NB-IOT Band 4	1000.000	0.199	1.000	Pass
NB-IOT Band 5	2845.116	0.566	0.566	Pass
NB-IOT Band 12	2397.728	0.477	0.477	Pass
NB-IOT Band 13	2638.761	0.525	0.525	Pass
NB-IOT Band 25	1995.262	0.397	1.000	Pass
NB-IOT Band 66	1000.000	0.199	1.000	Pass
NB-IOT Band 71	2337.222	0.465	0.465	Pass
NB-IOT Band 85	2397.728	0.477	0.477	Pass
Note: **R** = 20cm π= 3.1416				

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

ANNEX A: Product Change Description for BG95-M3

Quectel Wireless Solutions Co., Ltd

Statement

We **Quectel Wireless Solutions Co., Ltd** declare the following models:

Model Number: BG95-M3

According to the market's requirement, we will close LTE NB2&CatM1 Band 14 and NB-IoT Band 26 through software, their hardware are the same as before.

The change will not impact RF performance of Cat M1 and NB-IoT.

Your assistance on this matter is highly appreciated.

Sincerely,

Signature: Jean Hu

Name: Jean Hu

Title: Certification Section

ANNEX B: Product Change Description for BG95-M3&BG95-M3 MINIPCIE

Quectel Wireless Solutions Co., Ltd

Statement

We Quectel Wireless Solutions Co., Ltd declare the following models as series application.

Name: LTE Cat M1 & Cat NB2 & EGPRS Module
Parent Model: BG95-M3
Variant Model:BG95-M3 MINIPCIE

BG95-M3 and BG95-M3 MINIPCIE are all LPWA modules. They have the same frequency and use the same chipset and share the same software&hardware design.

BG95-M3 MINIPCIE makes up of BG95-M3 module and PCIecarrier board. Thecarrier board switchesBG95-M3 module to follow PCI Express Mini Card 1.2 standard connector protocol. No any other internal changes in BG95-M3 module.We hereby state that two models are identical in interior structure and components,and just connector interface is different for the marketing requirement.

Your assistance on this matter is highly appreciated.

Sincerely,
Name: Jean Hu Jean Hu
Title: Certification Section

********END OF REPORT ********